

3. Apparatus according to Claim 2, characterized by the fact that the downstream end of the flow channel (430) is designed as a nozzle, which is directed toward an inlet (436) of the return channel (438) opposite it and forms the fluid fed under high pressure into a sharp fluid jet, which can fragment vascular material of the patient on the open flow path section (432) and convey it into return channel (438).

4. Apparatus according to Claim 2 or 3, characterized by the fact that the sensor or measurement device (114, 414) has a pressure sensor or sound sensor to measure the pressure or noises of the fluid that are generated on the distal end section of the catheter.

5. Apparatus according to Claim 1 or 4, characterized by the fact that the therapeutic catheter (102) has at least one expansion element (108) on its distal end section, which is expandable by the fluid, that at least one fluid channel (116) is provided for fluid, which extends from the proximal end section (104) to the distal end section (106) through catheter (102) and is connected on the proximal end section (104) to a pressurized fluid source (110) and to the sensor or measurement device (114), which responds to pressure or noises or volume of the fluid that is fed to the at least one expansion element (108).

6. Apparatus with a therapeutic catheter for therapeutic treatment of vessels (12) in a patient, in which the catheter has a distal end section that can be inserted into a patient vessel, and a rotational element (322) on the distal end section, which can be driven for mechanical treatment of the patient vessel (12) by a shaft (320), which extends through the catheter in the longitudinal direction and can be driven on the proximal end section of the catheter by a drive (310), characterized by the fact that the shaft (320) is provided with a sensor or measurement device (314) which detects or measures the energy and/or energy changes that occur in the rotating shaft as a function of effects of the external surroundings (12) on the rotational element (322).

7. Apparatus according to Claim 6, characterized by the fact that the sensor or measurement device (314) detects or measures the torque of the driven shaft (320).

8. Apparatus according to one of the Claims 1 to 7, characterized by the fact that the sensor or measurement devices (114, 314, 414) have an acoustic signal generator (446) that converts the detected or measured values into acoustic signals audible to persons.

9. Apparatus according to one of the Claims 1 to 8, characterized by the fact that the sensor or measurement devices (114, 314, 414) have an optical display element (444) to convert and display the detected measured value.

10. Apparatus according to one of the Claims 1 to 9, characterized by the fact that the sensor or measurement devices (114, 314, 414) have a device that detects sound waves in the therapy fluid or in the shaft of a therapy rotational element, which develop by external effects on the fluid or rotational element, and at least one loudspeaker or earphone that makes these sound waves audible to the human ear.

Summary

Apparatus with a pneumatic or hydraulic or mechanical therapeutic catheter. The therapy energy required to treat internal vessels of the patient is transferred by the same fluid or the same elements from the proximal end section to the distal end section of the catheter that transfer information from the distal end section to the proximal end section of the catheter. The information provides understanding of the state of the vessel and how the therapy fluid of the therapy element of the catheter acts on the vessel.